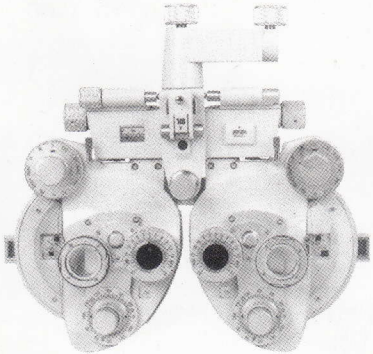


Refraction Instrument

Operation Instructions

REFRACTION INSTRUMENT

Table of Contents

1.OUTLINE 1

2.FEATURES 1

3.PRECAUTIONS UPON HANDLING 3

4.NAMES OF VARIOUS PARTS AND OPERATING PROCEDURES 4

5.BASIC OPERATION PROCEDURE 8

6.REFRACTION WAYS IN GENERAL 9

7. REFRACTION EXAMPLES BY VARIOUS AUXILIARY LENSES 18

8. CAUTIONS ON HANDLING 20

9. SPECIFICATIONS 21

SPECIFICATIONS

1.OUTLINE

This new model refractor has been developed to renovate the conventional refractor,assuming a new aspect,to turn the thought of the people who used the conventional model,to an entirely different subjective refractor,easy to master with the highest accuracy.

2.FEATURES

(1)The new set up leveling mechanism.

(2)Control of spherical powers:

Capable of measurement for the fullest range of +16.75D~0~-19.00D with the step of 0.25D.Furthermore by application of an auxiliary lens of +0.12D,they are measured with the step of 0.12D.By turning the spherical power quick forwarding dial,necessary powers could be obtained quickly with increment of 3.00D.

On the other hand by employing application of sphere auxiliary lenses of +10.00D and -10.00D,the wider powers of +26.75D~0~-29.00D could be measured.

(3)Measurement of cylinder powers and axis:

Cylinder powers could be obtained within the wider range of 0~-6.00D with an increment of 0.25D.Also by employing application of cylinder auxiliary lens of -0.12D,they are counted with an 0.12D step.Whilst by employing the attached cylinder auxiliary lens of -2.00D cylinder powers are capable for measurement within the wider range of 0~-8.00D.Cylinder axis angles are graded from 0~180° doubly with increment of 5° cylinder axis angle.

(4)Cross cylinder :

By turning the cylinder axis knob the cross cylinder will be moved by the peculiar synchronized mechanism .The cross cylinder will be turned over by turning the cross cylinder knob lightly.As option ± 0.37D, ± 0.50D cross cylinder lenses are available and could be exchanged conveniently.

(5)Rotary prism:

Measurable range for 20△ with 1 △ step is available.By turning the prism unit the click at 90° and 180° will be beetled.

(6)Convergence system:

By laying down the convergence lever inside ,a correct near point measurement is capable.

(7)Auxiliary lenses:

Described in the following specification.

Auxiliary lenses:By employing combinations of abundant auxiliary lenses and charts,various kinds of refractions are made.

"O"	:Open aperture
"R"	:Retinoscope lens +1.5D.(Standard)
"P"	:Polaroid(right eye:135° ,left eye:45°)
	*To be used for various polarizing test,for example heterophoria, binocular balance,stereoscopic view,etc.
"RMW"&"WMV"	:Vertical maddox(right eye;red,left eye;white)
	*Can be used for heterophoria,measurement.
"RMH"&"WMH"	:Horizontal maddox(right eye;red,left eye;white)
	*Can be used for heterophoria,measurement.
"RL"&"GL"	:Red,green lenses(right eye;red,left eye;green)
	*Can be used for heterophoria,precise checking of spherical surface,measurement.
"O"	:Test mark for P.D. adjustment.
"+1.2"	:+0.12D sphere lens.
"PH"	:Pin hole.
	*To check existence of amblyopia or not.
"6△ U or 10△ I"	:Prism dispersion:(right eye;6△ BU,left eye;10△ BI)
	*Can be used for heterophoria, measurement.
" ± .50"	: ± 0.50D fixed cross cylinder.
	*Can be used for near point measurement.
"OC"	:Occluder.

3.PRECAUTIONS UPON HANDLING

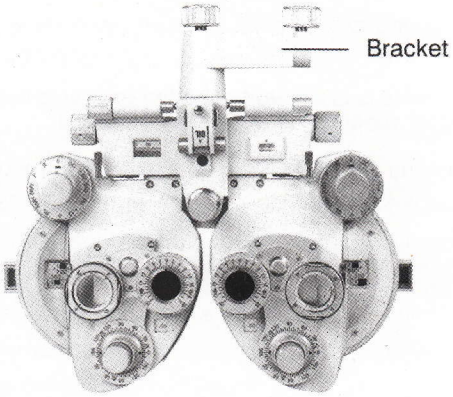
(1) To carry this instrument,hang the bracket of the upper part of the body, or hold in arms the left and the right rear body.

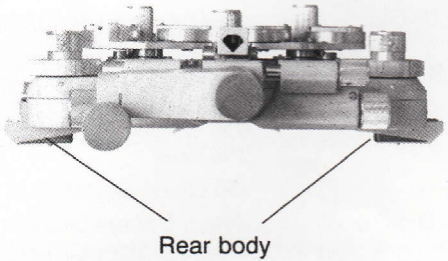
(2) Do not put the instrument by putting the front side (turret) downward,or do not push the turret side violently.Also please do not touch the hands on to the patient's window.

(3) Cover the instrument by the dust cover when it is not used.

(4) Please avoid to place it on a humid or dusty place.

(5) Turning mechanisms can be turned either ways.But if it does not be moved at all,please do not push to move it violently.





4.NAMES OF VARIOUS PARTS AND OPERATING PROCEDURES

This instrument has a pair of battery.Each battery includes sphere and cylinder lens assembly as well as auxiliary lenses.Brief descriptions of the several parts are given so that the operator will understand each function.

(1)Patient's window.
Patients have to peep from the back side.

(2)Near point rod clamp screw.
To insert the near point rod into the holder and tighten the near point rod.

(3)P.D.Scale.
To display theP.D.

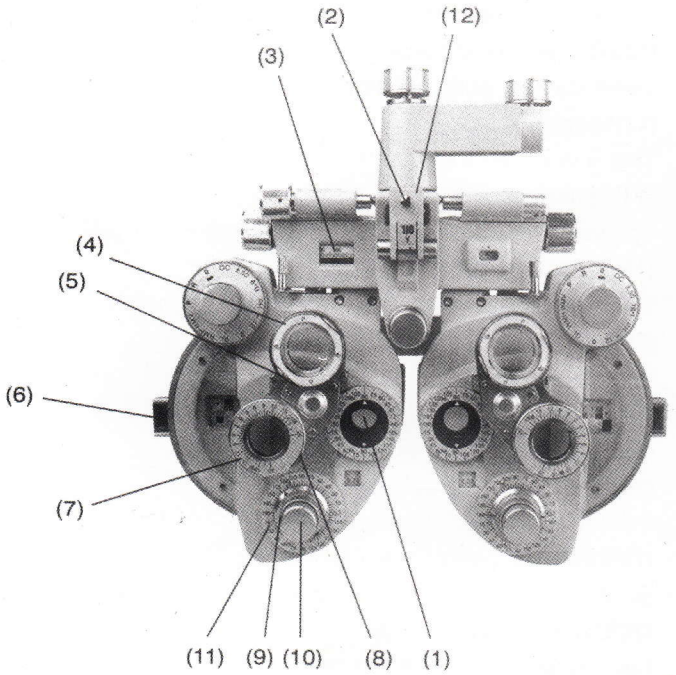
(4)Cross cylinder.
To compensate cylinder powers,accurate detection of axis and power are made.

(5)Cross cylinder kuob.
To change the cross cylinder axis and powers.

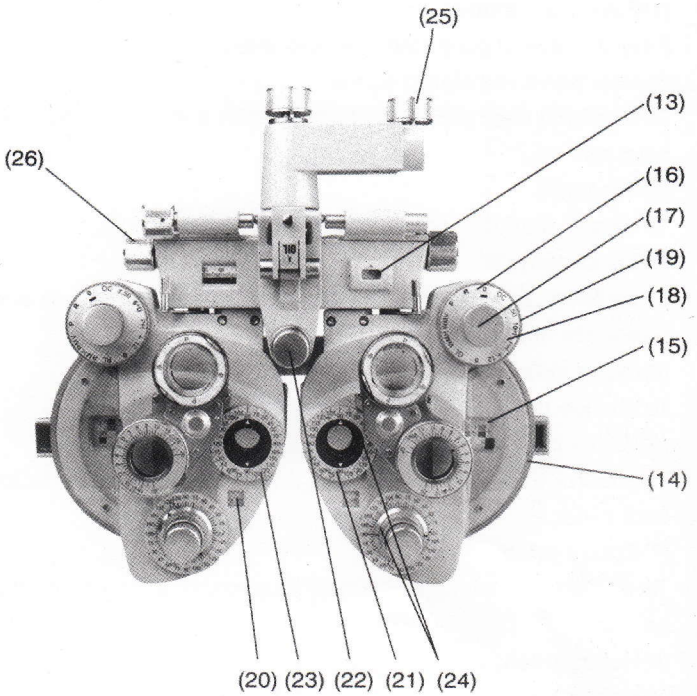
(6)Vertex distance watching window.
To confirm the distance between corneal vertex and refractor lens surface.

(7)Rotary prism.
To be used for measurement of heterophoria and binocular balance.

(8)Rotary prism kuob.
Prism dioptors can be changed by this prism knob.



(9)Cylinder axis knob.
Cylinder axis can be changed by this knob.
(10)Cylinder power knob.
Cylinder powers can be changed by this power knob.
(11)Cylinder axis angles.
This scale represents cylinder axis angles.
(12)Near point rod holder.
Insert the near point rod here.
(13)Level.
This is to set up a standard of the horizontal adjustment.
(14)Spherical disk.
Sphere powers are changed with a step of 0.25D.
(15)Sphere power scale.
These dioptors represent the sphere power scales.
(16)Index.
These represent auxiliary lenses inside the patient's window.
(17)Auxiliary lens knob.
Auxiliary lenses are changed by this knob.
(18)Auxiliary lens scale.
Descriptions of auxiliary lenses are represented.
(19)Spherical power quick forwarding dial.
Spherical lenses can be changed with 3.00D step's interval.
(20)Cylinder power scale.
Cylinder powers are shown here.



(21)Set pin.

Cylinder auxiliary lenses(-2.00D,-0.12D)as the standard accessories are set here by this set pin.

(22)Forehead rest knob.

To adjust the forehead back and forth position.

(23)Cylinder axis reference scale.

This scale represents the cylinder axis angle.

(24)Cylinder axis indicator.

This represents the cylinder axis angle.

(25) Clamp knob.

This knob fixes the refractor to the supporting shaft.

(26)P.D. adjustment knob.

By this knob P.D. can be adjusted to meet a certain patient's P.D.

(27)Rotation adjustment knob.

To change rotation of the body by loosening it and to fix it by fastening.

(28)Mounting bracket.

This is the fixing bracket of the body to a refraction unit stand etc.

(29)Leveling adjustment knob.

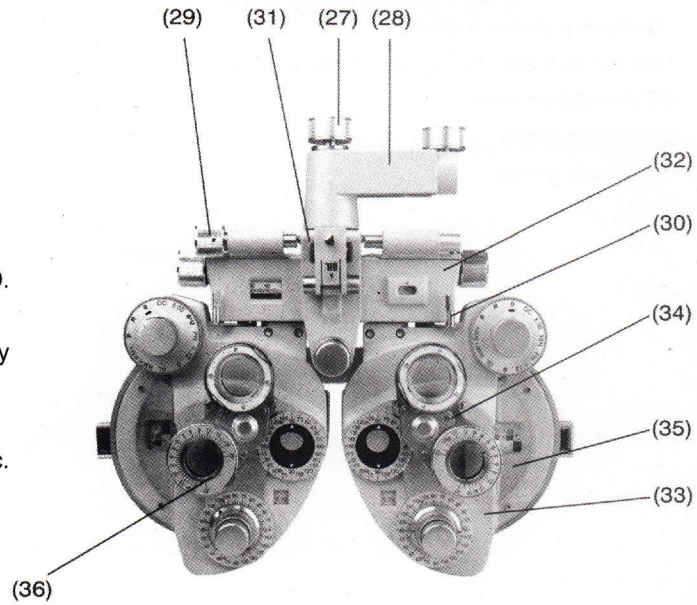
This is to adjust the horizontal leveling.

(30)Convergence lever.

This is to converge the body.

(31)Yoke.

(32)Body support.



(33)Body

(34)Turret.

This will interchange the cross cylinder and the rotary prisms.

(35)Spherical lens display cover.

This will enlarge and display the spherical lens power.

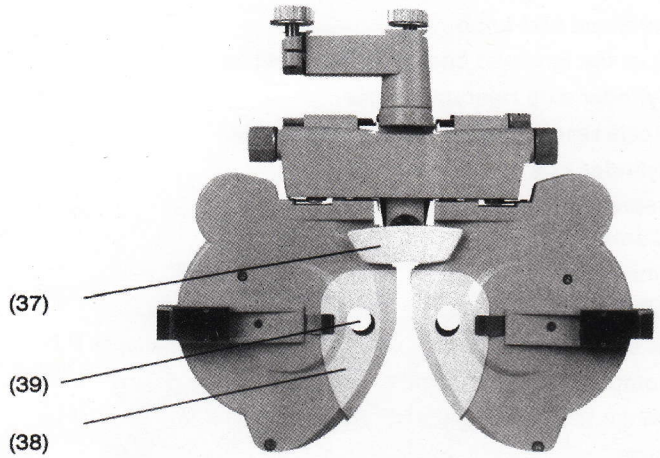
(36)Rotary prism indicator.

This will indicate the values of the prism dioptry.

(37)Forehead rest.

(38)Face shield.

(39)Cover glass.



5.BASIC OPERATION PROCEDURE

Mount the refractor on the ophthalmic stand arm.

Set the bracket(28) to the support shaft of the stand arm and fix it by the clamp knob(25).

The fixing screw of the accessory should be screwed in the support shaft from the lower part of the bracket(28).

(1)Hava a patient seat on the refraction chair exactly.

(2)Set the P.D. correctly.

While seeing the P.D. scale(3),and adjust P.D. by turning the P.D. adjustment knob(26).

(3)Set the refractor in front of patient and adjust the height of the refractor,the direction of the body and the horizontal level.

By moving the support shaft up and down,adjust the height of the refractor .

By loosening the rotation adjustment knob(27),adjust the direction of the body.

While seeing the level(13) and adjust the horizontal level by turning the leveling adjustment knob(29).

(4)Set the corneal vertex distance to 13.75mm.

The corneal vertex can be adjusted by moving the forehead rest.

(5)Set the auxiliary lens.

In case the refraction of the right eye ,set the right eye be opened as "O" the left eye be occuludered as "OC".

Align the position of the auxiliary lens scale to the index by turning the auxiliary lens knob.

(6)Set the sphere power.

While seeing the sphere power scale(15) and turn the spherical disk(14).

Sphere power can be changed 3.00D step by turning the spherical power quick forwarding dial(19).

(7)Set the cylinder axis.

Align the cylinder axis reference scale(23) to the cylinder axis indicator(24) by turning the cylinder axis knob(9).

(8)Set the cylinder power.

While seeing the cylinder power scale(20),turn the cylinder power knob.(10).

5.REFRACTOPN WAYS IN GENERAL

Before refracting by this instrument,it is necessary to know that patient's P.D.,the spherical power based the data of visual examination,the cylinder power and axis found by an objective examination.

6-1 SETTING OF REFRACTOR

[PROCEDURE]

(1) Turn the P.D. adjustment knob with seeing the P.D. scale,and set the P.D.

(2) By adjusting the height of the support shaft,align the height of the patient's window to the height of patient's eyes.

(3) By loosening the rotation adjustment knob,adjust the direction of the body in parallel with patient's eyes.

(4) By seeing the level,adjust the leveling adjustment knob so as to set in horizontal.

(5) Confirm the center of the pupil be aligned in the patient's window by seeing from the front.

(6) Adjust the forehead rest by the forehead rest knob,and set the corneal vertex distance to 13.75mm.

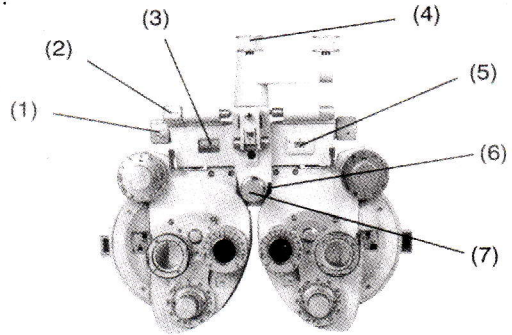
when the image of patient's eye is the center of the vertex distance watching window,the corneal vertex distance is 13.75mm.

(7) See from the front again and make adjustment of 2)3)4) be corrected.

(8) Stand backward to re-confirm the balance of patient and the refractor.

(9) Fix the refractor firmly.

(1)P.D.adjustment knob
(2)Leveling adjustment knob
(3)P.D.scale
(4)Rotation adjustment knob
(5)Level
(6)Forehead rest
(7)Forehead rest knob



6-2 VISUAL ACUITY CHECKING

[PROCEDURE]

(1) Turn the auxiliary lens knob by seeing the auxiliary lens scale and set the right eye be opened as "O" and left eye be occluded as "OC".

(2) Add the sphere power based data of inspected visual examination by turning the spherical disk.

The sphere power can be changed 3.00D step by turning the spherical power quick forwarding dial.

(3) By turning the cylinder power knob and the cylinder axis knob,add the cylinder power and axis found by objective examination.

(4) By turning the spherical disk,add the S+0.75D so as to the foggy condition.

(5) Align the 0.5 chart.

(In that case,we recommend to use NIDEK Model SCP-660 or SC-1100.)

(6) In case reading the 0.5 chart is completed,proceed to the next item 7).

If reading the 0.5 chart is not completed,proceed with the radiation test.

<RADIATION TEST>

a)Align the radiation chart.

b)By turning the spherical disk,add the S-0.25D step until the figure 1~12 on the radiation chart can be read out.

c)In case any lines of the radiation chart is seen deeply ,those lines are cylinder axis.

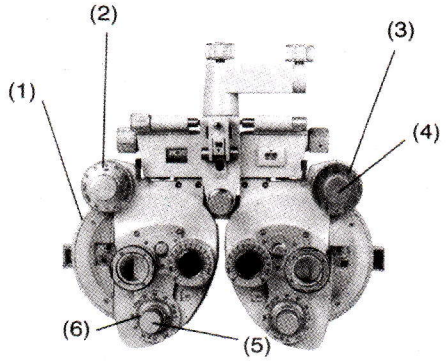
If 2 O'clock direction is seen deeply (fig.),cylinder axis is $2 \times 30=60^{\circ}$.

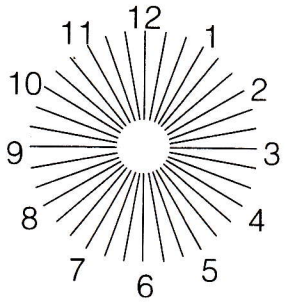
Align the cylinder axis indicator to the cylinder axis by turning the cylinder axis knob.

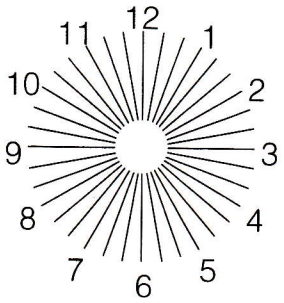
d)By turning the cylinder power knob,add the cylinder power until the deepness of the radiation chart become even color.

(7) Align the 1.0 chart.

(8) By turning the spherical disk,add S-0.25D step until 1.0 chart can be read out,and the fog condition is released.







(1)Spherical disk (2) Spherical power quick forwarding dial (3) Auxiliary lens scale (4) Auxiliary lens knob
(5) Cylinder power knob (6) Cylinder axis knob

6-3 RED GREEN TEST

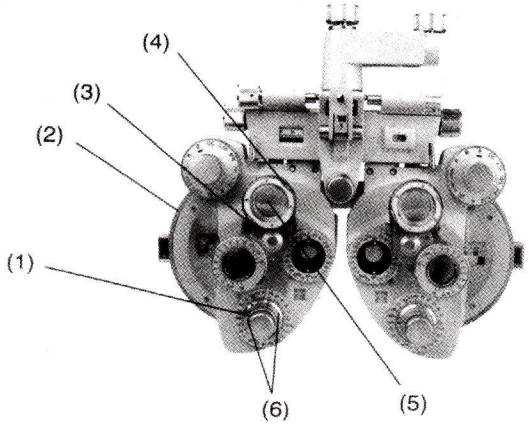
[PROCEDURE]

(1) Align the red green chart.

(2) Make sure which chart could be seen more clearly ,the black ring on the red ground or the black ring on the green ground.

(3) If the black ring on the red ground could be seen more clearly,add the S-0.25D by turning the spherical disk.
If the black ring on the green ground could be seen more clearly,add the S+0.25D by turning the spherical disk.

(4) Repeat item 2),3) until the black ring on the green ground can be seen a little bit better.



(1)Cylinder axis knob
(2)Spherical disk
(3)Turret
(4)Cross cylinder knob
(5)Cross cylinder
(6)Cylinder axis indicator

6-4 CYLINDER AXIS

[PROCEDURE]

(1) Align the dots chart.(if unvailable,the 0.7 chart)

(2) By turning the turret, set the cross cylinder to align patient's window.

(3) Align the revolving axis of the cross cylinder to the cylinder axis indicator and click.

(4) Turn over the cross cylinder by turning the cross cylinder knob and make sure which face is better.

(5) Toward the red point on the clearly seen face direction,interlock the cylinder axis by 15° by the cylinder power knob.

If the shade off through both face is similar,a precise cylinder axis will be determinded .

If the shade off through both face is not similar,return the cylinder axis 5° step until similar.

6-5 CYLINDER POWER

[PROCEDURE]

(1) Align the dots chart.(if unvailable,the 0.7 chart)

(2) By turning the turret, set the cross cylinder to align patient's window.

(3) Align the "P" mark on the cross cylinder to the cylinder axis indicator and click.

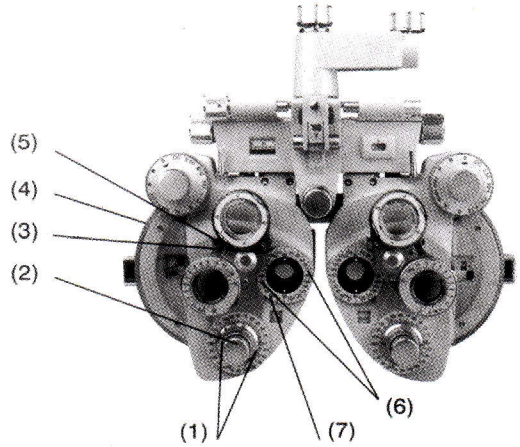
(4) Turn over the cross cylinder by turning the cross cylinder knob and make sure which face is better.

(5) If the face aligned "P" mark to the red point is better,add the C-0.25D by turning the cylinder power knob.

If the face aligned "P" mark to the white point is better,reduce the C-0.25D by turning the cylinder power knob.

N.B. If it would be necessary to add the C-0.5D or more,C/2 that is 0.25D S(equivalent spherical power) should be reduced.

(6) If the both seeing aspect is similar, a precise cylinder power will be determined.



(1) Cylinder axis indicator
(2) Cylinder power knob
(3) Cross cylinder knob
(4) Spherical disk
(5) Turret
(6) P mark
(7) Cross cylinder

6-6 SPHERE POWER MEASUREMENT

[PROCEDURE]

(1) Align the red green chart.

(2) Make sure which the chart can be seen more clearly the black ring on the red ground or the black ring on the green ground.

(3) When the black ring on the red ground is seen more clearly,add the S-0.25D by turning the spherical disk.
When the black ring of the green ground is seen more clearly,add the S+0.25D by turning the spherical disk.

(4) Repeat item 2)3) until average or in condition that the black ring on the red ground can be seen more clearly.

6-7 POWER CHECK

[PROCEDURE]

(1) Make sure the highest visual power by measuring the visual power in order from the 0.1 chart.

(2) While aligning the highest visual power chart, add S+0.25D by turning the spherical disk.

(3) If the visual power drop,turn the spherical disk back.

6-8 LEFT EYE POWER CHECK

Turn the auxiliary lens knob by seeing the auxiliary lens scale and set the right eye be occuluded as "O".
Return to 6-2 2),and proceed the check to 6-7.

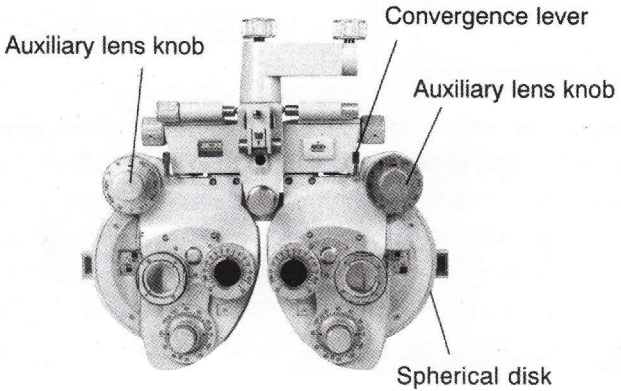
6-9 BOTH EYE BALANCE TEST

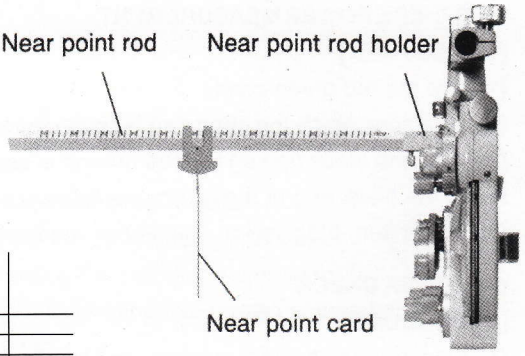
[PROCEDURE]

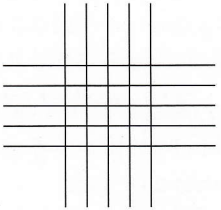
(1)Let the both eye be fused with balance chart.

(2)Set "P" polaroid on the both eyes by turning auxiliary lenses knob of left and right.

(3)Turn the spherical disk of better looking eye and add +0.25D.If the seeing aspect become similar,it means that both left and right eyes are fused for the balanced looking.







Cross lines table

6-10 STEREOSCOPIC VIEW TEST

[PROCEDURE]

(1) Align the accurate stereoscopic view chart.

(2) By the turning the auxiliary lens knob,set the auxiliary lenses of left and right to polaroid "P".

(3) Check the stereoscopic view test by the accurate stereoscopic view chart.

If the stereoscopic view is unavailable perform the binocular function examination.

6-11 NEAR POINT MEASUREMENT

[PROCEDURE]

(1) Train the both batteries on inside by the convergence lever.

(2) Lay down the near point rod which is set in near point holder.

(3) Align the cross lines table of the near point card.
(4) If the patient is above 50 years old,add the S+1.00D by turning the spherical disk.
(5) Set the near point card to the nearest distance(the near distance of the patient).
(6) Set the ± 0.50 cross cylinder in both auxiliary lenses by turning auxiliary lens knob.
(7) By turning the spherical disk,add the S+0.25D each until the vertical and horizontal lines of the cross lines table seems at quite same denity.

6-12 DISTANCE CORRECTION OF CORNEAL VERTEX POINT

This instrument is designed that the correct distance between the lens and the corneal vertex is 13.75mm.
If the corneal vertex distance is not same as appointed, correct the power by applying the distance correction table.
The corneal vertex distance can be confirmed by seeing the vertex distance watching window.
When the image of corneal is on the long line of the corneal vertex distance, it is the appointed distance.
(This has scales at interval of 2mm.)

Example 1

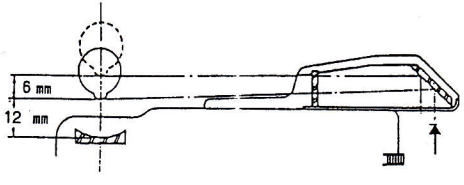
When the measured value is +8.00D by this instrument and the corneal vertex distance is 3mm longer, the correction value should become +0.19D from the correction table and the revised value shoule be:-

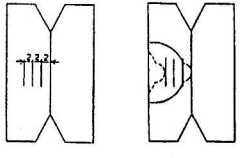
(+8.00D)+(+0.19D)=(+8.19D)

Example 2

When measured value is -11.00D by this instrument and the corneal vertex distance is 4mm longer, the correction value should become +0.46D from the correction table and the revised value should be:-

(-11.00D)+(+0.46D)=(-10.54D)





Vertex distance watching window

Example 3 (When desired to have the fitting of a glasses be 12mm)

When measured value is -5.00D by this instrument and the corneal vertex distance is 3mm longer, the appointed distance is 1.75mm longer against 12mm,the fitting of the glasses.

Total difference of the distance is 3mm+1.75mm=4.75mm.

The correction value is +0.12D from the correction table.

The revised value is:-

(-5.00D)+(+0.12D)=(-4.88D)

DISTANCE CORRECTION TABLE

PLUS

Power	Distance 1	Distance 2	Distance 3	Distance 4	Distance 5
+1.00	0.001	0.002	0.003	0.004	0.005
+2.00	0.004	0.008	0.01	0.02	0.02
+3.00	0.01	0.02	0.03	0.04	0.05
+4.00	0.02	0.03	0.05	0.07	0.08
+5.00	0.03	0.05	0.07	0.11	0.12
+6.00	0.04	0.07	0.10	0.16	0.18
+7.00	0.05	0.10	0.14	0.21	0.25
+8.00	0.06	0.13	0.19	0.27	0.33
+9.00	0.08	0.16	0.24	0.34	0.42
+10.00	0.10	0.20	0.30	0.42	0.52
+11.00	0.12	0.25	0.37	0.51	0.64
+12.00	0.15	0.30	0.45	0.61	0.77
+13.00	0.18	0.35	0.53	0.72	0.91
+14.00	0.21	0.41	0.62	0.84	1.06
+15.00	0.24	0.47	0.71	0.97	1.22
+16.00	0.27	0.53	0.81	1.11	1.39
+17.00	0.30	0.60	0.92	1.26	1.58
+18.00	0.33	0.67	1.03	1.41	1.78
+19.00	0.37	0.75	1.15	1.57	1.99
+20.00	0.41	0.83	1.28	1.74	2.22

MINUS

Power	Distance 1	Distance 2	Distance 3	Distance 4	Distance 5
-1.00	0.001	0.002	0.003	0.004	0.005
-2.00	0.01	0.01	0.02	0.02	0.02
-3.00	0.01	0.02	0.03	0.04	0.04
-4.00	0.02	0.03	0.05	0.06	0.08
-5.00	0.03	0.05	0.07	0.10	0.12
-6.00	0.04	0.07	0.10	0.15	0.17
-7.00	0.05	0.10	0.14	0.20	0.24
-8.00	0.06	0.13	0.19	0.25	0.31
-9.00	0.08	0.16	0.24	0.31	0.39
-10.00	0.10	0.20	0.30	0.38	0.48
-11.00	0.12	0.24	0.36	0.46	0.57
-12.00	0.14	0.28	0.42	0.55	0.67
-13.00	0.16	0.33	0.48	0.64	0.78
-14.00	0.19	0.38	0.55	0.74	0.90
-15.00	0.22	0.43	0.63	0.85	1.03
-16.00	0.25	0.49	0.72	0.96	1.17
-17.00	0.28	0.55	0.81	1.08	1.32
-18.00	0.31	0.62	0.91	1.21	1.48
-19.00	0.35	0.69	1.02	1.34	1.65
-20.00	0.39	0.77	1.13	1.48	1.82

7. REFRACTION EXAMPLES BY VARIOUS AUXILIARY LEMSES

7-1 HETEROPHORIA MEASUREMENT (HORIZONTAL MADDOX)

[PROCEDURE]

(1) Align a fixed point chart.

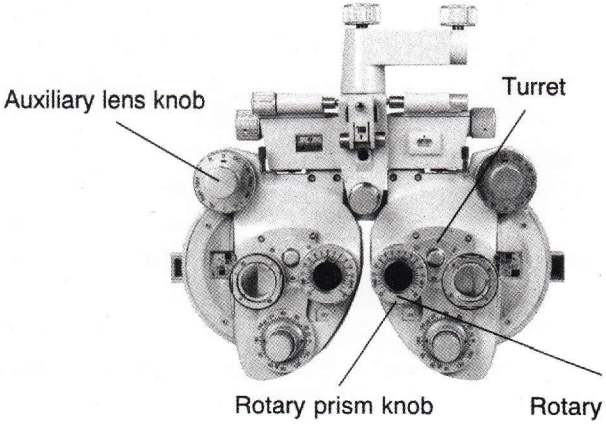
(2) Turn the auxiliary lens knob while seeing the auxiliary lens scale.Set the right eye horizontal maddox as "RMH" and the left eye be opened as "O".

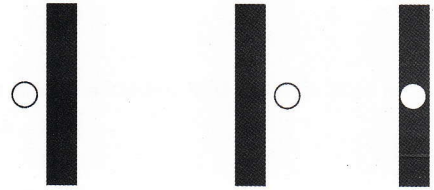
(3) By turning the turret,set the rotary prism on the patient's window of the left eye.

(4) Set 0 on the rotary prism scale to the vertical direction.

(5) Make sure whether the patient could see as shown below.

(6) If the patient sees as per the sketch above,then turn the rotary prism knob so that the patient can see as per the sketch shown on the right side.





Esophoria Exophoria

7-2 HETEROPHORIA MEASUREMENT (PRISM DISPERSION)

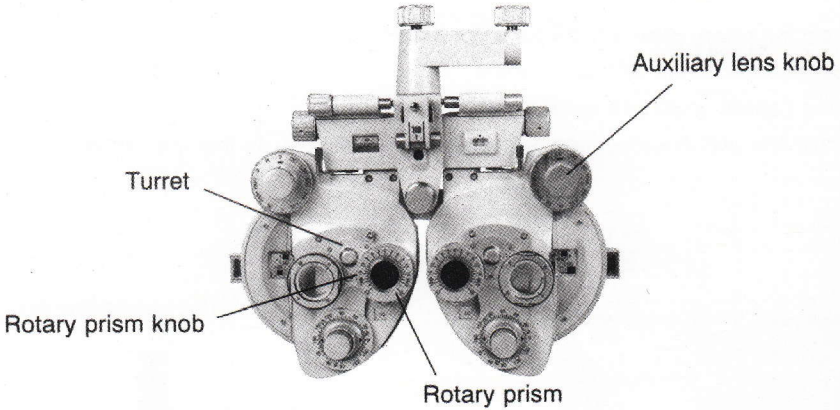
[PROCEDURE]

(1) Align the horizontally lineal figures charts.

(2) By turning the auxiliary lens knob,make the right eye be opened as "O" and left eye be kept at prism dispersion as"10△ I".

(3) By turning the turret, set the rotary prism on the patient's window of the right eye.

(4) Set 0 on the rotary prism scale to the horizontal direction.



(5) Make sure whether that patient can see as shown under:-

85642
85642
Left eye hyperphoria

85642
85642
Right eye hyperphoria

(6) If a patient could see as shown above,then turn the rotary prism knob and make correction the above sketches as shown on the right side sketch.

8. CAUTIONS ON HANDLING

(1) Cover the instrument, when not in use,by the dust cover.
(2) Keep away the instrument from dusty place and or moisture conditions.
(3) Wipe out the stain of the forehead rest and the face shield by alcoholic dipped cloth.
(4) Wipe out the stains of the body by the cylicon cloth attached as an accessory.
(5) Stains on the cover glass should be wiped out by alcoholic dipped cloth.
(6) Clean up the inner lenses as follows:-
a)Make up all the scales as 0 and or "O"as open.
b)Make the P.D. at its maximum 75mm.
c)Remove the face shield.
d)Remove the two screws and thin plate and take off the cover glass.
e)By the attached air brush as an accessory,clean up the face and back of lenses.When leaving stains which are unable to cleaned up by air brush,use a stick covered by an alcohole dipped cloth and wipe out such stains.

Place the following scales described as under and clean up in order:-
Ⅰ)Cylinder lenses:
.25,.50,.75,1.00,1.25,2.50,3.75,5.00.
Ⅱ)Make the cylinder lens dioptor as 0.
Ⅲ)Weaker spherical lenses:(Turn the spherical disk.)
+1.75,+1.50,+1.25,+1.00,+.75,+.50,+.25,-.25,-.50,-.75,-1.00.
Ⅳ)Return the spherical dioptor as 0 .
Ⅴ)Stronger spherical lenses:(Turn the spherical power quick forwarding dial.)
+3.00, +6.00,+9.00,+12.00,+15.00,-18.00,-15.00,-12.00,-9.00,-6.00,-3.00.

Ⅵ)Return the spherical lens dioptor as 0.

Ⅶ)Auxiliary lens:

right eye "R","P","RMV","RMH","RL","O","+.12","6△U"," ± .50".

left eye "R","P","WMV","WMH","GL","O","+.12","10△I"," ± .50".

9. SPECIFICATIONS

9-1.MESURABLE RANGE:

9-1-1 Sphere power	:Range:+16.75D~-19.00D When applied with auxiliary lenses +10.00D,-10.00D(option): +26.75D~29.00D Step:0.25D When applied with auxiliary lens +0.12D: Step:0.12D
9-1-2 Cylinder power	:Range:0D~-6.00D When applied with auxiliary cylinder lens -2.00D: 0D~-8.00D Step:0.25D When applied with auxiliary cylinder lens +0.12D: Step:0.12D
9-1-3 Cylinder axis	:Range:0° ~180° Step:5°
9-1-4 Cross cylinder	: ± 0.25D Cross cylinder lens synchronized with cylinder axis. (± 0.37D, ± 0.50D,cross cylinder lens (option))

9-1-5 Rotary prism :Range:0△~20△
Step:1△

9-2 P.D. ADJUSTMENT :50~75mm.

9-3 CONVERGENCE ADJUSTMENT :∞,380mm(When P.D.64mm.)

9-4 FOREHEAD REST ADJUSTMENT :16mm.

9-5 VERTEX DISTANCE :13.75mm(From corneal point to standard lens surface.)

9-6 DIMENSIONS :338(L) × 99(W) × 292(H)mm.

9-7 WEIGHT :Apporox.5kg

Table of Contents

:White grey.

9-9 AUXILIARY LENSES :By combinations of abundant auxiliary lenses, charts various kinds of refractions are made.

"O" :Open aperture

"R" :Retinoscope lens +1.50D(Standard)

"P" :Polaroid(right eye:135° ,left eye:45°)
*To be used for heterophoria,binocular balance, stereoscopic view,etc.,for various polarizing test.

"RMV"&"WMV" :Vertical maddox(right eye:red,left eye:white)
*Can be used for heterophoria,measurement.

"RMH"&"WMH" :Horizontal maddox(right eye:red,left eye:white)
*Can be used for heterophoria,measurement.

"RL"&"GL" :Red,green lenses(right eye:red,left eye:green)
*Can be used for heterophoria,precise checking of shperical surface,measurement.

"O" :Test mark for P.D. adjustment.

"+.12D" :+0.12D sphere lens.
*Measurable step can be made +0.12D.

"PH"	:Pin hole.
	*To check existence of amblyopia or not.
"6△ U or 10△ I"	:Prism dispersion:(right eye:6△ BU,left eye:10△ BI)
	*Can be used for heterophoria, measurement.
" ± .50"	: ± 0.50D fixed cross cylinder.
	*Can be used for near point measurement.
"OC"	:Occluder.

9-10 STANDARD ACCESSORIES:

1)One(1) pair of auxiliary cylinder lens -2.00D.
2)One(1) pair of auxiliary cylinder lens -0.12D.
3)One(1) piece air brush.
4)One(1) piece of cylicon cloth.
5)One(1) piece of fixing screw.
6)One(1) piece of near point card.
7)One(1) piece of near point rod.
8)One(1) piece of card holder.
9)One(1) piece of dust cover.

9-11 OPTIONAL ACCESSORIES:

1)One(1) pair auxiliary spherical lens +10.00D.
2)One(1) pair of auxiliary spherical lens -10.00D.
3)One(1) pair of ± 0.37D cross cylinder lens.
4)One(1) pair of ± 0.50D cross cylinder lens.
5)One(1) pair of auxiliary spherical lens +2.50D.(for retinoscope.)